

FCC 47 CFR MPE REPORT

Positive LLC

Guitar Speaker

Model Number: Spark LIVE

FCC ID: 2A348SPARKLIVE

Applicant :	Positive LLC
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Maximum Permissible Exposure

1. Applicable Standards

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

1.1. Limits for Maximum Permissible Exposure (MPE)

(a) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-10000			5	6

(b) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-10000			1.0	30

Note: f=frequency in MHz; *Plane-wave equivalent power density

1.2. MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric Field (V/m)

P = Peak RF output Power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained

2. Conducted Power Result

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)
GFSK	2402	4.75	2.985
	2441	4.11	2.576
	2480	3.54	2.259
$\pi/4$ -DQPSK	2402	5.25	3.350
	2441	4.61	2.891
	2480	4.14	2.594
8-DPSK	2402	5.59	3.622
	2441	4.89	3.083
	2480	4.38	2.742
BLE 1M	2402	5.93	3.917
	2440	6.26	4.227
	2480	6.87	4.864
BLE 2M	2402	6.12	4.093
	2440	6.51	4.477
	2480	7.06	5.082
IEEE 802.11b	2412	19.34	85.901
	2437	19.77	94.842
	2462	19.44	87.902
IEEE 802.11g	2412	20.60	114.815
	2437	21.08	128.233
	2462	20.51	112.460
IEEE 802.11n HT20	2412	20.75	118.850
	2437	21.37	137.088
	2462	20.60	114.815
IEEE 802.11n HT40	2422	20.45	110.917
	2437	20.23	105.439
	2452	19.99	99.770

3. Calculated Result and Limit

Mode	Peak output power (dBm)	Target power (dBm)	MAX Target power (dBm)	Antenna gain		Power Density (S) (mW /cm2)	Limited of Power Density (S) (mW /cm2)	Test Result
				(dBi)	(Linear)			
2.4G Band								
GFSK	4.75	4±1	5	4.25	2.661	0.00167	1	Complies
$\pi/4$ -DQPSK	5.25	5±1	6	4.25	2.661	0.00211	1	Complies
8-DPSK	5.59	5±1	6	4.25	2.661	0.00211	1	Complies
BLE 1M	6.87	6±1	7	2.71	1.866	0.00186	1	Complies
BLE 2M	7.06	7±1	8	2.71	1.866	0.00234	1	Complies
IEEE 802.11b	19.77	19±1	20	2.71	1.866	0.03713	1	Complies
IEEE 802.11g	21.08	21±1	22	2.71	1.866	0.05885	1	Complies
IEEE 802.11n HT20	21.37	21±1	22	2.71	1.866	0.05885	1	Complies
IEEE 802.11n HT40	20.45	20±1	21	2.71	1.866	0.04674	1	Complies

Note: WIFI 2.4G and BLE are share an antenna, Can't both the WIFI 2.4G and BLE operate simultaneously.

Simultaneous Transmission Mode (BT+WIFI Mode)

Mode	Result	Limit	Simultaneous Transmissions Result	Simultaneous Transmissions Limit	Total Result
BT	0.00211	1	0.06096	1	Complies
WIFI	0.05885	1			

End of Test Report